

REMARKS/ARGUMENTS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and claims 1, 3-14, and 16 have been amended as necessary to more clearly and particularly describe the subject matter in this application.

Claims 2 and 15 have been canceled without prejudice or disclaimer.

Claim Rejections – 35 USC § 103

Claims 1-16 were rejected under 35 U.S.C. 103(a) over Nii (U.S. Patent No. 5,804,947, hereinafter “Nii”) in view of Skrzypek et al. (U.S. Patent No. 6,645,017, hereinafter “Skrzypek”). For at least the following reasons, the Examiner's rejection is respectfully traversed. The asserted combination of Nii in view of Skrzypek, independently or in combination, does not teach or suggest all features of the claimed invention.

Independent claims 1 and 14 have been amended to incorporate the limitations of claims 2 and 15, respectively.

Nii generally represents a conventional hybrid vehicle propulsion system as known in the art. Nii generally presents a motor 10 and an engine driven generator 20 mounted in a hybrid electric vehicle that is controlled by a controller 28. The controller 28 comprises a motor controller 30 and a generator controller 32. The motor controller 30 controls the power conversion by a DC-AC inverter 12, while the generator controller 32 controls the generated power of the generator 20 so that a battery's state of charge (SOC) is within the target zone. Through these operations, the output torque of the motor 10 becomes a value in accordance with the vehicle accelerator angle or the brake depressing and the battery's state of charge is within the target zone.

With regard to claims 1 and 14, Applicant respectfully submits that Nii does not disclose or suggest, at least, “said regulating circuit is, in addition, arranged to permit an output current from said vessel's ordinary current supply system to said inverter which is higher than said charging current, in a first operating mode and said regulating circuit is arranged to limit said output current while maintaining the torque for said motor, in a second operating mode...said regulating circuit is arranged to assume said second operating mode when said battery voltage is below said limit value for the battery voltage, in order thereby to prevent said battery voltage from dropping further,” as recited in claim 1 and similarly recited in claim 14. Skrzypek fails to cure the deficiencies in Nii as failing to disclose or suggest the above-mentioned limitations.

The added limitations indicate that the selection between the first and second operating modes is made based on a comparison between the battery voltage and a limit value for the battery voltage and that the output current to the inverter is limited while the torque for the AC motor is maintained in the second operating mode. In comparison, Nii is directed to accurately controlling the state of charge (SOC) of the battery within a target zone by controlling the generated power based on the charging and discharging of currents rather than controlling the generated power based on the accumulated charged-and-discharged power.

In response to Applicant's arguments, the Office action asserted that PgMax and PgMin of Nii correspond respectively to the “an output current...higher than said charging current” and the limited output current. However, the rejection based on Nii still appears improper for the following reasons. First, PgMax and PgMin refer to the generated power of the generator 24 instead of current. Second, the “output current” in claims 1 and 14 refer to the current out of the vessel's ordinary current supply system and is to be distinguished from “a charging current from said generator to said battery” to which the “output current” is compared. Similarly, in Nii, the charging or discharging current IB of the battery 14 that is detected by sensor 44 should be

distinguished from the inverter input current I_1 detected by the sensor 38. Third, the limitation “said regulating circuit is arranged to limit said output current” means that the output current will have a maximum value rather than a minimum value (e.g., P_{gMin}). P_{gMin} of Nii would not limit the output current as claimed because, in the second operating mode of the present invention, the current value would be prevented from exceeding a given value.

Furthermore, the hybrid vehicle of Nii would not function satisfactorily nor safely if an output of the current is limited while maintaining torque when said battery voltage is below said limit value for the battery voltage, in order thereby to prevent said battery voltage from dropping further. For example, if the air conditioning of the hybrid vehicle is turned on while the vehicle is cruising with the constant torque, this could lead to the battery voltage drop under the limit value, whereby, to maintain the torque, the speed of the motor must be reduced. In other words, the problem would arise where turning the air conditioning on in the car reduces the speed of the vehicle. In Nii, when a constant torque is to be maintained in the vehicle, this is enabled by ensuring that the state of charge of the battery is within the target zone. Thus, e.g., when the driver turns the air conditioning on, it may result in more electrical power generation, instead of limitation of current to the inverter.

Therefore, even if there were references disclosing these features, a person of ordinary skill in the art would not be able to combine them with the hybrid vehicle of Nii to arrive at the presently pending claims because the combination would not work satisfactorily.

In contrast, according to the present claims, in the second operating mode, the motor torque is maintained constant, while preventing the battery from discharging, at the cost of temporarily reduced speed. This scheme works well with AC using apparatuses such as refrigerators, where a temporarily reduced speed of the motor, for example, compressor is not

particularly harmful. At the same time, power supply is ensured to other electronics connected to the same DC power supply.

Therefore, Nii and Skrzypek fail to disclose or suggest all of the limitations of claims 1 and 14, and thus fail to provide these advantages.

Claims 3-13 and 16 depend upon claims 1 and 14, respectively. Thus, claims 3-13 and 16 should be allowed for at least their dependencies upon claims 1 and 14 and for the recitations recited therein.


On page 4, the Office Action took the position that U.S. Patent Publication No. 2007/0052243 and Patent No. 7,459,801 of Shimoyama et al. (Shimoyama) and U.S. Patent Publication No. 2006/0160873 or 2002/0193197 and U.S. Patent No. 6,461,266 or 6,726,588 of Weisz (Weisz) disclose a control circuit for measuring the charging current from the generator and the battery voltage to control the generator for different stages/modes/conditions of the vehicles. However, Applicant respectfully submits that Shimoyama and Weisz do not disclose or suggest, at least, "said regulating circuit is arranged to limit said output current while maintaining the torque for said motor, in a second operating mode," as recited in claim 1 and similarly recited in claim 14.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned agent to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, our Order No. 39334.

Respectfully submitted,

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